

Sensitivity Experiments

For this exercise, you will set up and run the WRF EMS to test the sensitivity of a forecast to different controllable parameters, many of which were discussed during the previous presentations. Each group will run a unique experiment (Appendix A) and compare the results to a control simulation (Appendix B). Due to the time required to run the simulations, you will initiate your runs today and do the post-processing and analysis tomorrow. Each group will then present their observations to the class in a brief 10-minute presentation.

Day 1: Set up the model and run the experiment

Step I Create a computational domain

Just like in the previous exercise, you need to create your computational domain using the static initialization GUI. For each of the sensitivity experiments, the areal coverage and grid spacing of the model domains are the same. The specifications for the ARW core domain are the same as those used for the control study. A screen capture of the SIGUI horizontal domain configuration window is provided in appendix C.

Do: % **sigui**

The name that you provide for your domain in the SIGUI should be “Experiment #” where “#” is the number of the experiment that you have been assigned.

Note that only the groups conducting experiments 5 and 6 will need to change the number of vertical levels in the model domain, just because they’re special. All other groups should use the default number of levels (31).

When your domain is configured, go ahead and run the localization, which should take a few minutes. When the localization has completed, exit out of the SIGUI with a “yes” and “yes”. You have done this step before.

Do: % `cd $WRF_RUN/<your domain>`

Step II Process the initialization files

Most of the experiments will be using the 12km NAM data set (`--dset nam218`) for the model initial and boundary conditions. The exceptions will be experiments 7 and 8, which will be using the 0.5 degree global GFS grids. All the initialization files have been placed in a location defined in the corresponding `<dset>_gribinfo.conf` file for your safety; thus, you will be using “`--nfs`” as the file acquisition method, just as with the previous exercise.

Do: **Run wrf_prep to process the grib files:**

Experiments 1, 2, 3, 4, 5, and 6:

Do: % `wrf_prep --dset nam218 --date 20070301 --cycle 12 --nfs --sfcset ssthr --snfs --length 24`

Experiment 7:

Do: % `wrf_prep --dset gfsgrb2 --date 20070301 --cycle 12 --nfs --sfcset ssthr --snfs --length 24`

Experiment 8:

Do: % `wrf_prep --dset gfsgrb2%nam218 --date 20070301 --cycle 12 --nfs --sfcset ssthr --snfs --length 24`

When `wrf_prep` has completed you can move on to step III.

Step III Configure the Simulation

Experiments 1, 2, 3, and 4 involve making changes to the default model physics (see appendix A). All the model physics settings are located in the conf/wrf_run/run_physics.conf file, which is the only file you need to edit. All other model configurations have been previously incorporated into your WRF EMS for the purpose of the instructor's sanity.

Do: edit conf/wrf_run/run_physics.conf

Unless you are Experiments 5, 6, 7, or 8, then don't.

Step IV Run the simulation

The next step in making a simulation is to run the wrf_run routine. The final output from wrf_run are WRF forecast files in netCDF format, which will be processed further by wrf_post.

All Do: % wrf_run --SMDM

All Do Not: *Do anything else with this exercise. You are done for the day!*

Appendix A: Summary of Sensitivity Experiments

Name	Core	Cumulus Scheme	Dynamics	Microphysics	Other	Compare to run(s)
Control ARW	ARW	KF	Non-Hydro	Lin	31 levels	
Experiment 1	ARW	BMJ	Non-Hydro	Lin		Control ARW
Experiment 2	ARW	Grell	Non-Hydro	Lin		Control ARW
Experiment 3	ARW	None	Non-Hydro	Lin		Control ARW
Experiment 4	ARW	KF	Non-Hydro	WSM3		Control ARW
Experiment 5	ARW	KF	Non-Hydro	Lin	21 levels	Control ARW
Experiment 6	ARW	KF	Non-Hydro	Lin	61 levels	Control ARW
Experiment 7	ARW	KF	Non-Hydro	Lin	0.5 deg Global GFS	Control ARW
Experiment 8	ARW	KF	Non-Hydro	Lin	0.5 deg GFS IC with 12km NAM BCs	Control ARW

Note: Grey Shaded entries are the value that will need to be changed for the respective experiment

Appendix B: WRF EMS ARW Control Experiment Model Configurations

1 March 2007 Tornado Outbreak

Initialization Dataset:

Date:	01 March 2007
Cycle run:	1200 UTC NAM Model forecast
Data set	12km 218 grid
BC frequency:	3 hourly

Model Domain: ARW

Grid spacing:	10km
Grid points(IM x JM):	251 x 251
Model levels:	31
Grid Center:	85W 32N
Map Projection	Lambert Conformal

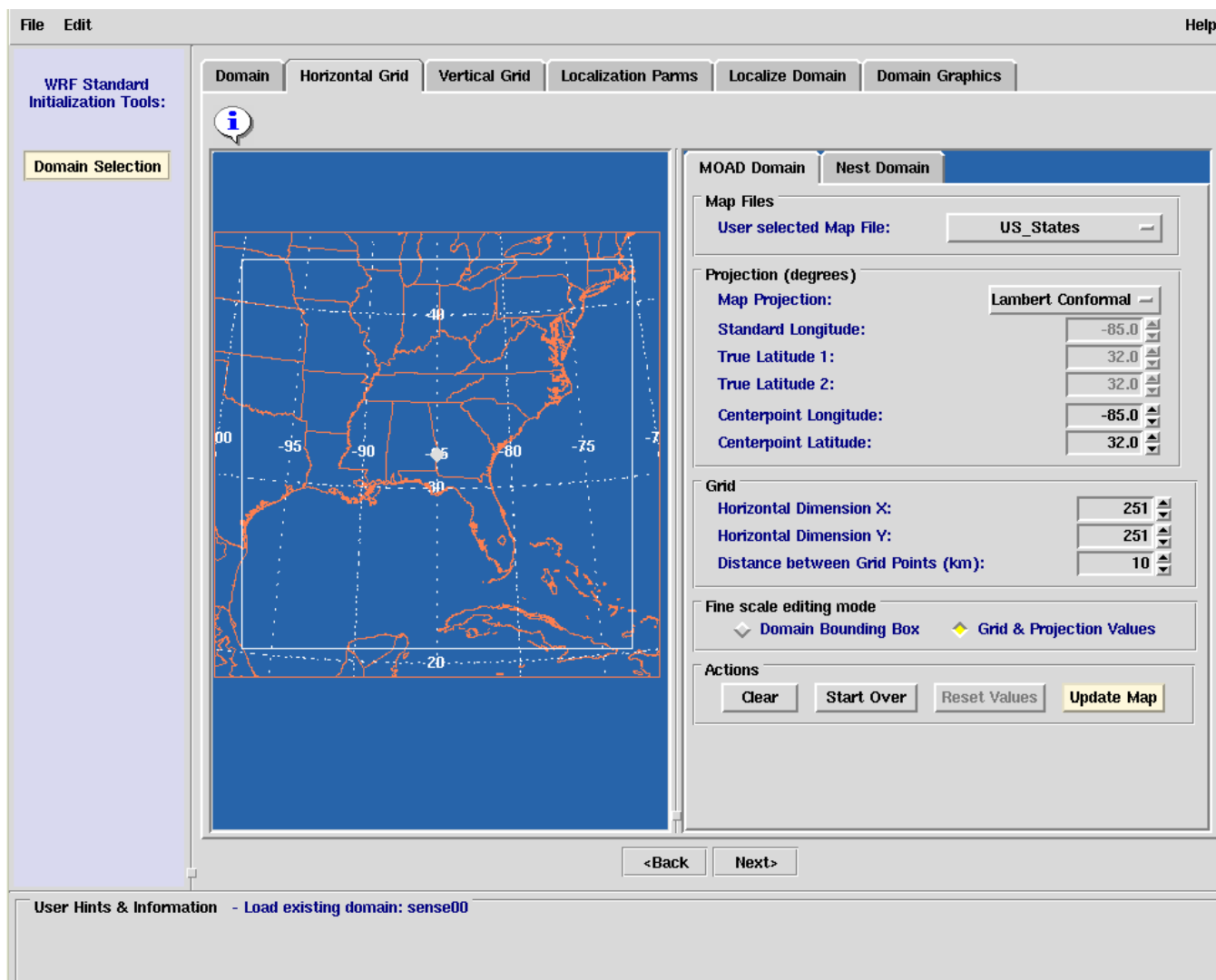
Model Forecast Details:

Forecast length:	24 hours
Model timestep:	60 seconds
Cumulus scheme	Kain-Fritsch
Microphysics	Lin
Dynamics	Non-Hydro

Model Output Information:

Output frequency:	3-hourly
Precip Accum Freq:	3-hourly
Output levels:	From 1000 to 50mb every 25mb

Appendix C: What your horizontal domain configuration window should look like



Appendix D: 24 Hour Stage IV Precipitation Estimates

